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| Abstract |  |
| In recent years, significant progress has been made in modern micro- and nanotechnologies for micro/nano-electronic devices. These technologies are increasingly utilizing sophisticated fluid media to enhance performance. Among the new trends is the simultaneous adoption of *nanofluids and biological micro-organisms.* Motivated by bio-nanofluid rotating disk oxygenators in medical engineering, in the current work, a mathematical model is developed for steady convective von-Karman swirling flow from an impermeable radially stretched disk rotating in a Darcy porous medium saturated with nanofluid doped with gyrotactic micro-organisms. Anisotropic slip at the wall and blowing effects due to concentration are incorporated. The nano-bio transport model is formulated using nonlinear partial differential equations, which are transformed to a set of similarity ordinary differential equations (SODEs) by appropriate transformations. The transformed boundary value problem is solved by a Chebyshev spectral collocation method (CSCM). Impacts of key parameters on dimensionless velocity components, concentration, temperature and motile microorganism density distributions are investigated and graphically visualized. Validation with previous studies is included. It is found that that the effects of suction provide a better enhancement of the heat, mass and microorganisms transfer in comparison to blowing. Moreover, physical quantities decrease with higher slip parameters irrespective of the existence of blowing. Temperature is suppressed with increasing thermal slip, while nanoparticle concentration is suppressed with increasing wall mass slip. Micro-organism density number increases with the greater microorganism slip. Radial skin friction is boosted with positive values of the power law stretching parameter, whereas it is decreased with negative values. The converse response is computed for circumferential skin friction, nanoparticle mass transfer rate and motile micro-organism density number gradient. Results from this study are relevant to novel bioreactors, membrane oxygenators, food processing and bio-chromatography. | |